

We claim:

- Sub A1
1. An endocardial chamber mapping system comprising:
 - a) a catheter assembly having
 - i) an array of signal acquisition electrodes expandable from a substantially cylindrical shape to an expanded shape, and
 - ii) a catheter plug with multiple connections, each of the connections being electrically coupled to a single electrode;
 - b) an interface apparatus having
 - i) an interface plug adapted to be connected to the catheter plug to establish electrical connection to the electrodes,
 - ii) a voltage acquisition apparatus in communication with the electrodes having an analog to digital converter, and
 - iii) a signal generator in communication with the electrodes for generating low current pulses; and
 - c) a computer having
 - i) electrical communication with the signal generator of the interface apparatus to control its function,
 - ii) electrical communication with the voltage acquisition apparatus to receive the voltage acquired by the signal acquisition electrodes,
 - iii) processing unit to compute the three-dimensional volumetric electric field distribution based on the signals received from the signal acquisition electrodes, and
 - iv) a display showing the computed field distribution.

2. The endocardial chamber mapping system of claim 1, wherein the computer further comprises:
- v) means for obtaining data relating to volume and shape of the endocardial chamber through the generation of low current pulses by the signal generator,
- and wherein the display shows the obtained volume and shape of the endocardial chamber.
3. The endocardial chamber mapping system of claim 2, wherein the display shows the computed field distribution in a continuously filled color-scale map shown over the volume and shape of the endocardial chamber.
4. An endocardial chamber mapping system comprising:
- a) a catheter assembly having
 - i) an array signal acquisition electrodes expandable from a substantially cylindrical shape to a substantially spherical shape, and
 - ii) an electrical connector plug with multiple connectors electrically coupled to the electrodes;
 - b) voltage acquisition apparatus in communication with the electrodes having an analog to digital converter; and
 - c) a computer having
 - i) an electrical communication with the voltage acquisition apparatus to receive the voltage acquired by the signal acquisition electrodes,
 - ii) a processing unit capable of computing the three-dimensional volumetric electric field distribution based on the voltage at the signal acquisition electrodes, and

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